

WHAT IS CLAIMED IS:

1. An apparatus for rotating a semiconductor substrate comprising a substrate holder for carrying the substrate thereon, a rotor for directly or indirectly supporting the substrate holder, a magnetic floating mechanism for magnetically floating and supporting the rotor in a non-contact state, and magnetic rotating mechanism for magnetically rotating the rotor, wherein

the magnetic floating mechanism and magnetic rotating mechanism are formed as a single integral unit structure,

the unit structure includes a first set of windings for generating a magnetic field to provide the rotor with a rotating force, and a second set of windings for generating a magnetic field to float and support the rotor at a predetermined position,

the first and second sets of windings are disposed on a single yoke plate made of a magnetic material.

2. An apparatus according to Claim 1, wherein the rotor is a ring-shaped rotor, and the ring-shaped rotor indirectly supports the substrate holder by way of supporting members.

3. An apparatus according to Claim 1, further comprising a barrier wall disposed between the outer surface of the rotor and the inner surface of the yoke plate in contact with only the yoke plate, resulting in that the first and second sets of windings are positioned on the yoke plate outside the barrier wall.

4. An apparatus according to Claim 1, further comprising beads made of a magnetic material which are embedded in portions of the barrier wall, the portions lying in magnetic paths along which magnetic fluxes generated by the first and second sets of windings pass.

5. An apparatus according to Claim 1, further comprising magnets disposed on the top surface of the yoke plate near the rotor or on the top surface of the rotor near the yoke plate, for generating magnetic fluxes in a direction orthogonal to the top surface of the rotor to thereby improve the rigidity of passive stability axes.

6. An apparatus according to Claim 1, wherein the first set of windings comprise +U, -U, +V, -V, +W and -W phase winding components and the second set of windings comprise  $\alpha$  and  $\beta$  axis winding components, each component of the first set of windings is positioned correspondingly to each component of the second set of windings, and the pairs of the components of the first and second sets of windings are located on the yoke plate at the vicinity of the inner surface thereof and at equal intervals in the circumferential direction thereof.

7. An apparatus according to Claim 7, wherein the  $\alpha$  and  $\beta$  axes are set to coincidence with the X and Y of the horizontal plane motion coordinate.